CLAIMS

What is claimed is:

1. A lithium battery comprising:

a lithium negative electrode prepared by melting lithium metal under an inert gas atmosphere and coating the liquid lithium metal on a metal current collector;

a positive electrode;

a separator placed between the positive and negative electrodes; and

an electrolyte comprising a lithium salt and organic solvents, contained in the positive and negative electrodes and the separator.

2. The lithium battery according to claim 1, wherein the liquid lithium metal is coated using a doctor blade.

3. The lithium battery according to claim 1, wherein the liquid lithium metal is coated using a calendering process.

4. The lithium battery according to claim 1, wherein the current collector is nickel, copper or a metal-sprayed nickel or copper, and the metal being sprayed is a lithium-wetting metal.

5. The lithium battery according to claim 4, wherein the lithium-wetting metal is selected from the group consisting of Al, Si, and Sn.

6. The lithium battery according to claim 1, wherein said positive electrode further comprises a binder selected from the group consisting of polyvinylidene fluoride, polytetrafluoroethylene, polyvinyl acetate, polyethylene oxide, polypyrrolidone, and polyvinyl alcohol.

7. A lithium-sulfur battery comprising:

a lithium negative electrode prepared by melting lithium metal under an inert gas atmosphere and coating the liquid lithium metal on a metal current collector;

a positive electrode comprising a positive active material, an electrically conductive material and a binder, the positive active material comprising at least one sulfur-based material selected from the group consisting of elemental sulfur and solid Li_2S_n ($n \geq 1$) coated on a current collector;

a separator placed between the positive and negative electrodes; and

an electrolyte comprising a lithium salt and organic solvents, contained in the positive and negative electrodes and the separator.

8. The lithium-sulfur battery according to claim 7, wherein the liquid lithium metal is coated using a doctor blade.

9. The lithium-sulfur battery according to claim 7, wherein the liquid lithium metal is coated using a calendering process.

10. The lithium-sulfur battery according to claim 7, wherein the current collector is nickel, copper or a metal-sprayed nickel or copper, and the metal being sprayed is lithium-wetting metal.

11. The lithium-sulfur battery according to claim 10, wherein the lithium wetting metal is selected from the group consisting of Al, Si, and Sn.

12. The lithium-sulfur battery according to claim 7, wherein the binder is selected from the group consisting of polyvinylidene fluoride, polytetrafluoroethylene, polyvinyl acetate, polyethylene oxide, polypyrrolidone, and, polyvinyl alcohol.

13. The lithium battery according to claim 1, wherein the lithium battery retains 90% or greater of a capacity at the fiftieth charging and discharging cycle as compared to the capacity at the first charging and discharging cycle.

14. The lithium battery according to claim 1, wherein the lithium battery retains 70% or greater of a capacity at the one hundredth charging and discharging cycle as compared to the capacity at the first charging and discharging cycle.

15. The lithium battery according to claim 13, wherein the lithium battery retains 70% or greater of the capacity at the one hundredth charging and discharging cycle as compared to the capacity at the first charging and discharging cycle.

16. The lithium battery according to claim 7, wherein the lithium battery retains 90% or greater of a capacity at the fiftieth charging and discharging cycle as compared to the capacity at the first charging and discharging cycle.

17. The lithium battery according to claim 7, wherein the lithium battery retains 70% or greater of a capacity at the one hundredth charging and discharging cycle as compared to the capacity at the first charging and discharging cycle.

18. The lithium battery according to claim 17, wherein the lithium battery retains 70% or greater of the capacity at the one hundredth charging and discharging cycle as compared to the capacity at the first charging and discharging cycle.

19. A method of manufacturing a lithium battery, comprising:

coating a liquid lithium metal on a current collector to create a negative electrode;

obtaining a positive electrode;

placing a separator between the positive and negative electrodes to produce an assembly; and

soaking an electrolyte into the assembly.

20. The method according to claim 19, further comprising melting a lithium metal under a gas atmosphere to produce the liquid lithium metal.